ZOOLOGY.

The Central Nervous System of Teleosts.—In the last number of La Cellule, a preliminary paper by Van Gehuchten on the central nervous system of the trout[1] adds several points of considerable interest to our already large stock of knowledge of the structure of the nervous system of vertebrates as determined by the epoch-making Golgi methods. Its value, and that of other papers by competent students, lies not only in adding so much to the known facts concerning the lower vertebrates, but more especially in the light that it throws upon obscure points in the cerebral structure of the higher animals and of man, where the central organs are so large and complex as to render investigation very difficult and even impossible. The older writers, Stieda, Fritsch, Rabl-Rückhardt, Edinger and others, concerned themselves almost wholly with the homologies of the brain of Teleosts. It was not until 1887 that the Golgi method was first employed with them by Fusari. Since then, Schaper, P. Ramon and Retzius have used it. And, if to their work we add that of Nansen and Retzius on the nervous system of *Petromyzon* and that of v. Lenhossek on that of *Pristiurus*, the list will be almost complete for fishes in general.

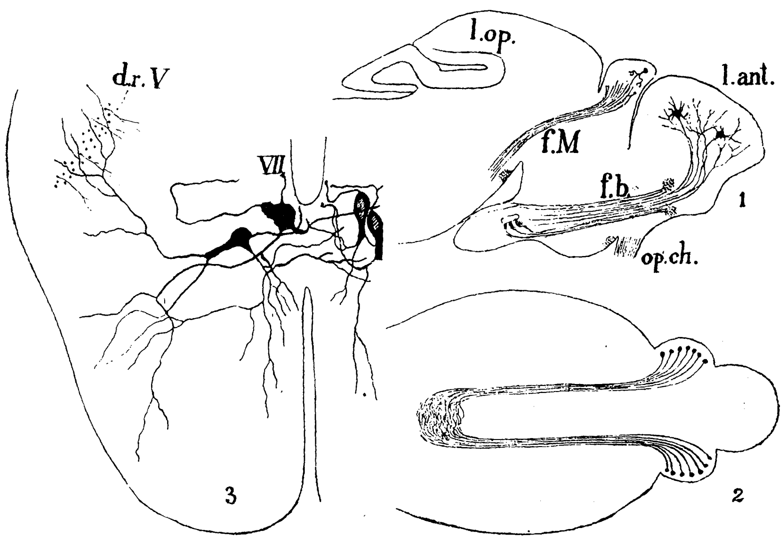
Van Gehuchten takes up (1) the structure of the anterior lobes, which, by the way, are homologous, as shown by Rabl-Rückhardt, with the caudate and lenticular nuclei only of the human brain; (2) the origin of the fibres of the cerebral peduncle; (3) the origin and termination of the fascicle of Meynert; (4) some of the constituent elements of the optic lobes; (5) the origin and termination of the olfactory fibres; (6) the origin of the *oculomotor communis*; (7) origin of the facial nerve; (8) the origin and the peripheral and central terminations of the auditory nerve; (9 and 10) the elements of the Gasserian ganglion, of the trigeminal nerve and of the large ganglion in the course of the pneumogastric, as also of the arrangement of the fibres of these in the cerebral trunk.

Regarding the anterior lobes and the cerebral peduncle, the most important fact brought out is that the latter is composed of both ascending and descending fibres, or, to use the terminology recently proposed by Fish, neurites. The former cannot therefore be regarded with

[1] Le System nerveux des Téléeostéens, La Cellule, Vol. X, pp. 255--95, with 3 pls.

Edinger as merely ganglia for the origin of the peduncular neurites. The interlobular commissures are shown not to be compared with the anterior commissure of human anatomy where merely two opposite lobes are connected. Each of the commissures is composed of neurites that branch off from the basal peduncle and branching cross to and terminate among the protoplasmic processes, or dendrites, of the opposite lobe.

The fascicle of Meynert, which has hitherto been a great puzzle, is explained as being composed of neurites arising from cells in the *ganglia habenulæ* and terminating near the lower surface of the brain in the so-called interpeduncular body. Here they branch profusely,



KENYON ON BRAIN STRUCTURE.

Fig. 1. Longitudinal section of a trout brain passing to one side of the median line.—l.ant., anterior lobes; l.op., optic lobe; f. b., basal fascicle; c. p., cerebral peduncle; f. M., fascicle of Meynert arising from the cells in the ganglion habenulæ; op. ch., optic chiasma, behind which is the commissure of Gudden, and in front of which are the interlobular commissures. Near the fascicle of Meynert is the ansiform commissure.

Fig. 2. The fascicles of Meynert viewed from above, each ending in the interlobular body.

Fig. 3. Transverse section through the nucleus of origin of the facial nerve VII, neurite of the facial nerve; d. r. v., descending root of the fifth with its short collaterals.

mingling with one another, and come in contact with the dendrites and cells of the body. While this explains that the fascicles are composed of fibres of but one kind, nothing is known of the fibres that go to the ganglia habenulæ to complete the circuit. Hence the function of the fascicles is still an open question.

The most interesting point, besides the solution of the structure, origin and termination of the fascicles of Meynert, that appears in the paper, concerns the conductive function of the dendrites. Such a function has been denied them by Kölliker, who still maintains his original ground. His objections are based on the fact, as he states it, of there being protoplasmic processes in certain parts of the white matter of the human brain where they cannot come in contact with nerve endings. Now van Gehuchten shows that in the anterior lobes the ascending or sensory fibres from the basal peduncle terminate freely among the processes or dendrites of the cells of the descending fibres, and that there is no third cellular element between them. And, what is more to the point and of greater weight, he finds that the extremely lengthened dendrites of the cells giving rise to the facial nerve penetrate the descending root of the trigeminal from the neurites of which are given off short, fine collaterals. It has been that shown among Batrachia and elsewhere such means of completing the nervous circuit exists, but Kölliker has persisted in denying any value to these facts when man is considered. The nervous circuit may, he says, be more easily explained without the dendrites. To this van Gehuchten adds that the matter would be still more simple were the collaterals left out. But dendrites and collaterals exist and it is our business to explain them. Moreover, further study of the brain of the higher animals and of man may, and probably will, show that in those places in which Kölliker supposes none to exist, collaterals really occur, and that their not being seen hitherto is to be explained by the difficulties that beset the path of the investigator when he takes up so complex and highly-developed a structure as the human and mammalian brain.

It is with considerable force that van Gehuchten finishes his consideration of the question. From the moment, he says, that any one admits, as one must, the conductive function of the dendrites of the mitral cells of the olfactory bulb, of the cells of Perkinje in the cerebellum, of the cells of the optic lobes in birds, of the ganglionic cells of the retilia, of the pyramidal cells of the cerebral cortex, one may demand upon what decisive grounds any one can find support for a denial of the same function in the dendrites of the medulla.

—F. C. KENYON.

New Deep Sea Fishes.—A preliminary account of new types of deep water fishes from the northwestern Atlantic is given (Proceeds. U. S. Natl. Museum, Vol. XVII, 1894) by Dr. G. Brown Goode and Tarleton H. Bean. Two new families, Cetonimidae and Rondeletiidae, represented by *C. storeri, C. gillii* and *R. bicolor.* The second family is distinguished from the first by the presence of ventral fins, and the incompleteness of the opercular apparatus. Both are Malacopterygian fishes, belonging to the group set aside by Gill under the name Iniomi. Only a single specimen of each species was obtained from depths ranging from 1,043 to 1,641 fathoms.

Another remarkable type belongs to the Chimaeroid group, from the existing forms of which it differs in the extremely elongate, muzzle, and the feeble claspers. Four specimens were obtained, two of them young, and with proportions shorter than those of the adults. The habitat of this genus is given as off the coasts of Virginia, Maryland and Delaware, 707 to 1,080 fathoms. It is described under the name *Harriotta raleighana.*

All the types are figured, and in the next number of the Naturalist, we will reproduce them.

Preliminary Notes on the Osteology of the North American Crotalidae.—I desire to present a preliminary paper giving some characters of the osteology of the *Crotalidae.* I have to thank Dr. O. P. Hay and Mr. M. S. Farr, Fellows in the University of Chicago, for furnishing me specimens for this work. Also, I am under obligations to Dr. George Baur, Assistant Professor in the University of Chicago for special favors and suggestions.

I am able to give both specific and generic characters of the genus Ancistrodon. The species *A. contortrix* was obtaind near Johnstown, Pa., while *A. piscivorus* was secured at Enterprise, Miss. Of the genus Sistrurus I have examined two species, namely, *S. miliarus* from Florida and *S. catenatus* from Indiana. Also I have examined two species of Crotalus, namely, *C. horridus* from Tuscarora Mountain, Pa., and also one specimen from near Johnstown, Pa., and *C. confluentus* collected in Kansas.[1] In addition, we have examined one individual each of *C. horridus* and of *S. catenatus* now in the Museum of Monmouth College. The locality of these specimens is not known.

[1] I have also examined a skeleton in the collection of the Field Columbian Museum, and labelled "*Crotalus durissus* Texas." The identification of this specimen is not at all certain, but it seems to be *C. adamanteus atrox* or *C. molossus.*

Since I have undertaken a more detailed study of these snakes, I omit from this article extended remarks on geographical distribution and specific characters. Neither have I, at this stage of my work, thought best to adopt any system of classification[2].

I desire to make a few general statements. The upper surface of the skull of *Crotalidae,* in comparison with the skulls of other snakes, is quadrate in outline. The interobital region, owing to the elevation of the outer edges of the frontals and outer anterior angles of the parietals, is concave.

The nasal bones are loosely attached. The prefrontals are quadrate in outline, movable, and are between the frontals and maxillaries. The maxillaries occupy a vertical position in front of the orbit and are attached above to the prefrontals and behind to the ectopterygoids. Each possesses a well-developed poisonous fang, and, in its outer surface, a conspicuous and characteristic pit. The parasphenoidal surface is concave and divided by a longitudinal median ridge-like process. Well-developed ventral processes are present on all the vertebræ of the body. The latter never exceed 200, the combined number of body and caudal vertebrae not commonly reaching this number.

Of the family Crotalidae the Ancistrodon shows the least specialization while the highest development is found in the Crotalus. The development of the family is shown in the following ways:

1. By the expansion and flattening of the anterior portion of the skull. This, also, takes place to a less extent in the petrosal region.

2. By the development of the maxillary fang and consequent change in the position and shape of the maxillaries and prefrontals.

3. As specialization proceeds there is a decrease in the number of teeth. Besides the fangs, no teeth are found on the maxillaries, and, except in Ancistrodon, none exist on the pterygoids posterior to their junction with the ectopterygoids.

4. The freedom and mechanical arrangement of the nasals, prefrontals, maxillaries, palatines, pterygoids and ectopterygoids is quite notable.

[2] In this brief article we shall not attempt to refer to the numerous authorities consulted. However, it should be stated, perhaps, that the general osteology of the Crotalidae has been worked out and discussed by various naturalists. The results of their works have appeared in many publications and under various dates. Also, we wish to state that Peters, as early as 1862, briefly mentions the craniology of the genus Ancistrodon.

Hr. W. Peters hielt einen Vortrag uber die craniologischen Verschiedenheiten der Grubenottern (Trigonocephali) und uber eine neue Art der Gattung Bothriechis. Monatsberichte der Koniglichen Preufs. Akademie der Wissenschaften zu Berlin, 1862, p. 670.

5. The various vertebral processes increase in length and the ribs of the median portion of the body show a decided tendency to become longer, thus giving the body a spindle-shape.

6. The vertebræ of the body increase in number from Ancistrodon to Crotalus, while the caudal vertebræ show a reverse tendency. In Ancistrodon, the ratio of the body and caudal vertebræ is approximately as 4 to 1, in Sistrurus 5 to 1, and in Crotalus 7 to 1.

Ancistrodon Beauvois, 1799.

Upper surface of the petrosal region convex and not unusually extended to form a support for the squamosals. Post-orbital portion of the parietals without lateral expansions. Pterygoids toothed posterior to their junction with the ectopterygoids. Posterior ends of the ectopterygoids grooved and notched and placed in a socket formed in the upper surface of the pterygoids. Palatines either triangular or club-shaped; in the latter case, attached to the pterygoids by their more expanded ends.

Post-frontals rudimentary if present. Posterior caudal vertebræ not cöossified, i. e., end ossicle absent.[3] Number of vertebræ of the body from 140 to 154; tail 40 to 54.

Eastern and southern United States and Mexico.

Ancistrodon piscivorus La Cepede, 1787.

Outer opening of the lachrymal foramen slit-like and on the anterior margin of the prefrontal. Palatines club-shaped and their more expanded ends attached to the pterygoids.

Number of vertebræ of the body from 138 to 145; tail 30 to 48.

Ancistrodon contortrix Linne, 1766.

Outer opening of the lachrymal foramen on the anterior upper surface of the prefrontal and situated just beneath a small pointed process. Palatines small and triangular in outline, with the obtuse angle pointing upwards. According to Peters, *A. contortrix pugnux* possesses a palatine bone equiangular in outline.[4]

Number of vertebræ of the body from 150 to 155; tail 25 to 40.

[3] In the Rattlesnake, some seven or eight posterior caudal vertebræ coossify, in the process of the growth of the animal, and the bone thus formed has been variously named. J. Czermak speaks of these coossified vertebræ as "Endkorper der Wirbelsaule": see Ueber den Schallenzeugenden Apparat von Crotalus zeitschrift fur wiss. Zoologie. Bd., VIII, p. 294, 1857. Hoffman accepts the name given by Czermak: see Dr. H. G. Bronn's Klassen und Ordnungen des Thier reichs. Sechster Band. III, Abtheilung. Reptilien, III, p. 1417, 1890. Garman calls this bone the Shaker: see On the Evolution of the Rattlesnake. Proc, Bos. Soc. Nat. Hist., Vol. XXIV, 1889.

[4] Loc. cit., p. 673.

Systrurus Garman, 1883.

Lateral expansion of the petrosal region slight. Squamosal short and its posterior end widened into a hook-like process for the attachment of the quadrate. Pterygoids not toothed posterior to their junction with the ectopterygoids and their posterior expanded portions more curved than in other genera. The ectopterygoids are grooved for the reception of the pterygoids. However, their posterior ends are not notched, as in Ancistrodon, but are attached to the pterygoids for a much greater length than in either of the remaining genera. The palatines are triangular and attached to the pterygoids at the acute angle, the obtuse angle being nearer the anterior end of the palatines. Postfrontals rudimentary. Posterior caudal vertebræ cöossified, i. e., end-ossicle present.

Number of vertebræ of the body from 130 to 153; caudal vertebræ from 20 to 35.

United States and Mexico.

I omit the specific characters until opportunity is offered for the study of a wider range of specimens.

Crotalus Linne, 1758.

Petrosal region expanded and the outer edge of the petrosal slightly upturned so as to form a support for the squamosal. The parietals possess clearly marked lateral expansions which connect with the anterior ends of the petrosals. Squamosals relatively more curved than in other genera, not hooked, but their posterior ends expanded. Pterygoids not toothed posterior to their junction with the ectopterygoids.[5] Posterior ends of the ectopterygoids grooved but not notched, and the pterygoids not notched for the reception of the ectopterygoids. The palatines are club-shaped and attached to the pterygoids by their more pointed ends. The postfrontals are well-developed, border the orbital surface of the parietals, and connect with the frontals. The posterior caudal vertebræ are coossified, i. e., possess a well-developed end-ossicle.

Number of vertebræ of the body from 165 to 187; tail from 19 to 32.

United States, Mexico and Brazil.

Explanations of Plates.

Fig. 1.—Squamosal of *A. piscivorus*.

Fig. 2.—Squamosal of *A. contortrix*.

Fig. 3.—Squamosal of *S. catenatus*.

[5] If Dumeril's plates be correct, *C. durissus* does not agree in this respect: see Prodrome de Classification des Ophidiens, 1852. Planche 2, Figs. 14 and 15.

Fig. 4.—Squamosal of *C. confluentus.*
Fig. 5.—Squamosal of *C. horridus.*
Fig. 6.—*A. piscivorus.* a, Pterygoid; b, Ectopterygoid; c, Palatine.
Fig. 7.—*A. contortrix.*
Fig. 8.—*S. catenatus.*
Fig. 9.—*C. confluentus.*

—W. Edgar Taylor.
Acting Professor of Biology, Monmouth College, Monmouth, Illinois.

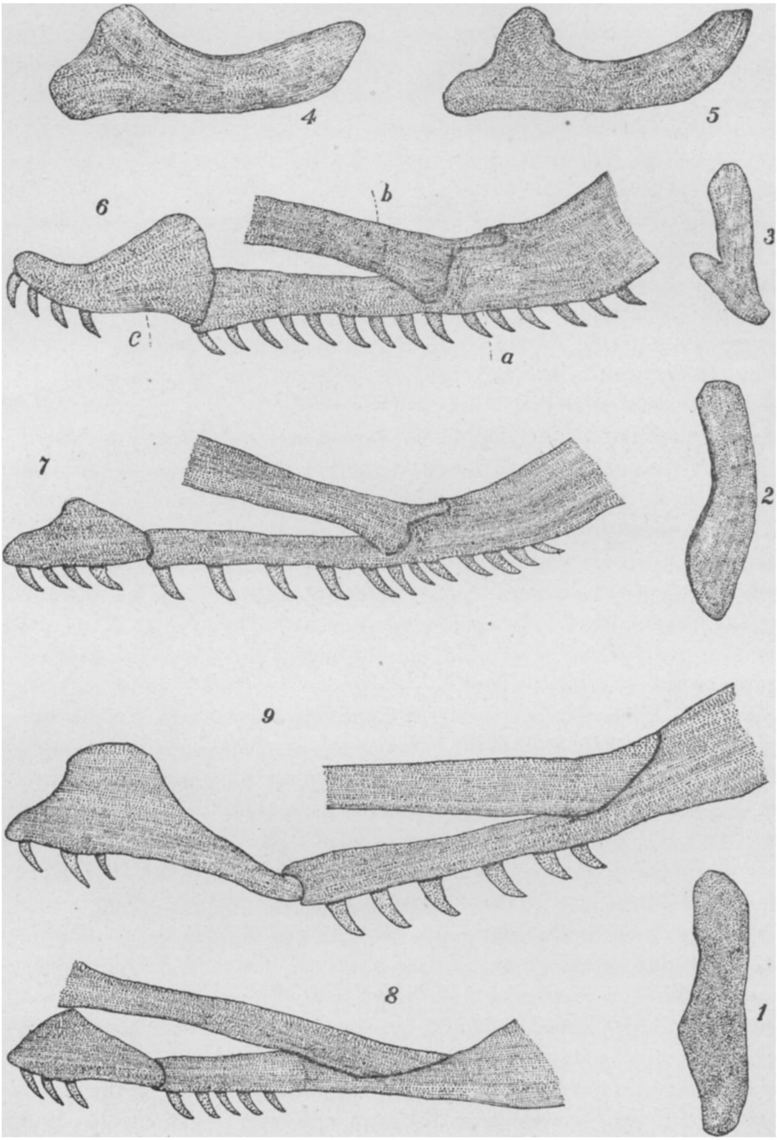
Zoological News.—Pisces.—The little-known Agonoid Fish, *Hippocephalus japonicus,* is described by F. Cramer. The description is based on an alcoholic specimen presented to the California Academy of Sciences by Dr. Krause, of Berlin. The specimen is 360 mm. long, and was obtained in the Okhotsk Sea. (Proceeds. Cal. Acad. Sci., Ser. 2, Vol. IV, 1894.)

Mammalia.—The Price collection of mammals from southeastern Arizona, and the Granger collection from South Dakota, recently acquired by the American Museum of New York, include a number of new forms, ten of which are described by Dr. J. A. Allen. The collections and the observations of the collectors greatly extend the recorded range of many species of mammals. (Bull. Am. Mus. Nat. Hist., 1894.)

A collection of mammals sent to the American Museum from New Brunswick, numbers about 250 specimens, and contains representatives of several species worthy of note, among which are two specimens of *Synaptomys cooperii* Baird. This is the first record of the genus Synaptomys from New Brunswick. (Bull. Am. Mus. Nat. Hist., 1894.)

In the annotated list of Florida Mammals prepared by Dr. F. M. Chapman, four orders are represented, as follows: Glires, 27; Chiroptera, 10; Insectivora, 4; Carnivora, 12. (Bull. Am. Mus. Nat. Hist., 1894.)

PLATE XVIII.



Taylor on Crotalidae.